Using Poultry Litter Biomass as a Fuel for Electrical Generation

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In the past few years land application utilization of poultry litter has become a major issue on the Delmarva Peninsula because of its high phosphorous content. The Maryland Water Quality Improvement Act of 1998 (2) regulates the application of manures and inorganic fertilizers. As a result there is an excess of broiler litter in some Delmarva counties. Alternate uses are being investigated. Some include combustion, feed for ruminant animals, reduced application rates for crop production, using GIS to apply for a cropping system, and processing and removing from the area for crop production in areas deficient in animal manures. The Research and Innovative Technology Section of the National Poultry Environmental Dialogue (1) discusses several of these. Many combustion options for poultry litter are shown.

Data in Table 1 shows BTU values of poultry litter using bomb calorimetry (Parr Instrument Company, 3) to determine its energy value. The average values range from 5265 to 6593 BTU per pound of litter depending on the moisture content. Ninety five samples were analyzed to determine the energy values in Table 1. The data are presented for two situations: poultry litter as is; and poultry litter pelletized. The data show some variations because poultry litter is not homogenous in content. To produce more homogenous samples litter will be ground and combusted loose and pelletized. These data will also be presented in addition to those in Table 1.

Table 1. Energy Values for Broiler Litter

Litter Condition	Range-Percent Moisture	Energy Value BTU/pound
Loose	10-15	6593
Loose	15-20	5853
Loose	20-25	6139
Loose	25-30	5265
Pellets	10-15	5920
Pellets	15-20	5856
Pellets	20-25	5995
Pellets	25-30	5737

This presentation will also address using poultry litter as a fuel for a 5 MW electrical generation system. The electricity generated will be used to operate a poultry processing plant and the excess will be sold to an electrical grid. The generation plant will use a gasification process to operate its electrical generation system. This presentation will describe the plant's operations. It will utilize approximately 40,000 tons of poultry litter per year to meet its fuel requirements.

In summary, the data presented show a variation in BTU values per pound from 5265 to 6593. These variations can be contributed to the broiler litter not being homogenous in content. Efforts are underway to construction a 5 MW Electrical Generation System for a poultry processing plant. The excess electricity will be sold to an electrical grid. This presentation will reinforce one of the Innovative Technologies suggested in the National Poultry Environmental Dialogue Report. (1)

References

[1]. Carr, L. E. 1998. Research and Innovative Technology Section. National Poultry Environmental Dialogue, U. S. Poultry and Egg Association, Tucker, GA.
[2]. Maryland Water Quality Improvement Act. 1998.
[3]. Operation Instructions for 1108 Oxygen Combustion Bomb. Parr Instrument Company